

Navigation Certification (NAVCERT) including ECDIS-N Certification




Presented for:
RADM Richard West
CNO N096, Navigator of the Navy

Presented By:
Robert Greer
SPAWAR Systems Center
7 Sept 2000

Outline

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- The background of the slide features a stylized, semi-transparent globe. Overlaid on the globe are several yellow lines representing satellite orbits or data paths. There are also small, detailed images of ships and a satellite in orbit, suggesting a focus on maritime technology and navigation systems.
- ☐ *Purpose of Today's Brief*
 - ☐ *Requirement to Certify ECDIS-N Systems*
 - ☐ *ECDIS-N Certification Process*
 - ☐ *Basic Plan for NAVCERT including ECDIS-N certification*
 - ☐ *NAVCERT INST revisions and status*
 - ☐ *ECDIS-N Certification test procedure description and development schedule*
 - NAVSSI
 - VMS
 - ☐ *NAVCERT Background/Overview*
 - ☐ *FY02 battlegroup NAVCERT (w/ECDIS-N) plan*
 - ☐ *Issues*

Purpose of Today's Brief...

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- The background of the slide features a semi-transparent globe. Overlaid on the globe are several yellow lines representing the movement paths of ships. These paths are curved and crisscross the globe, indicating global deployment or tracking. Several ship icons are also visible, positioned along these paths.
- ☐ ***Provide details on our plan to certify ECDIS-N systems in the fleet***
 - ☐ ***Show the plan and schedule to certify the ECDIS-N systems for the two battlegroups (USS Abraham Lincoln and USS George Washington-Nassau) deploying in FY02***
 - ☐ ***Provide same information and background on what led us to this point in time***

Follow on to 19 March 2001 brief to CNO N096



Definition of ECDIS-N

From OPNAVINST 9420.2 (2001):

Electronic Chart Display and Information Systems-Navy (ECDIS-N)-

a navigation information system which, with adequate backup arrangements, complies with the up-to-date chart required by regulation V/20 of the 1974 Safety of Life at Sea (SOLAS) Convention and Navy Instructions. It displays selected information from a System Digital Nautical Chart (SDNC) with positional information from navigation sensors to assist the operator in route planning and route monitoring, and by displaying additional navigational-related information.

<http://www.hq.navy.mil/ECDIS-N/>



Requirement to Certify ECDIS-N Systems

CNO ECDIS-N Policy (1998)

"Certify that ECDIS-N systems comply with the standards set forth in this Policy prior to authorizing use of ECDIS-N systems in lieu of paper charts"

OPNAVINST 9420.2 (2001)
**Implementation of ECDIS-N
Certification Process**

"The Commander, Naval Sea Systems Commands (COMNAVSEASYS COM) shall revise the current certification of Navigation Systems Program (NAVCERT) (reference (e)) and provide a Navy wide method to test uniformly the integrated navigation suite of a Navy vessel..."

NAVSEAINST 9420.4 (2001)

"Navigation Certification (NAVCERT) Including ECDIS-N Certification"



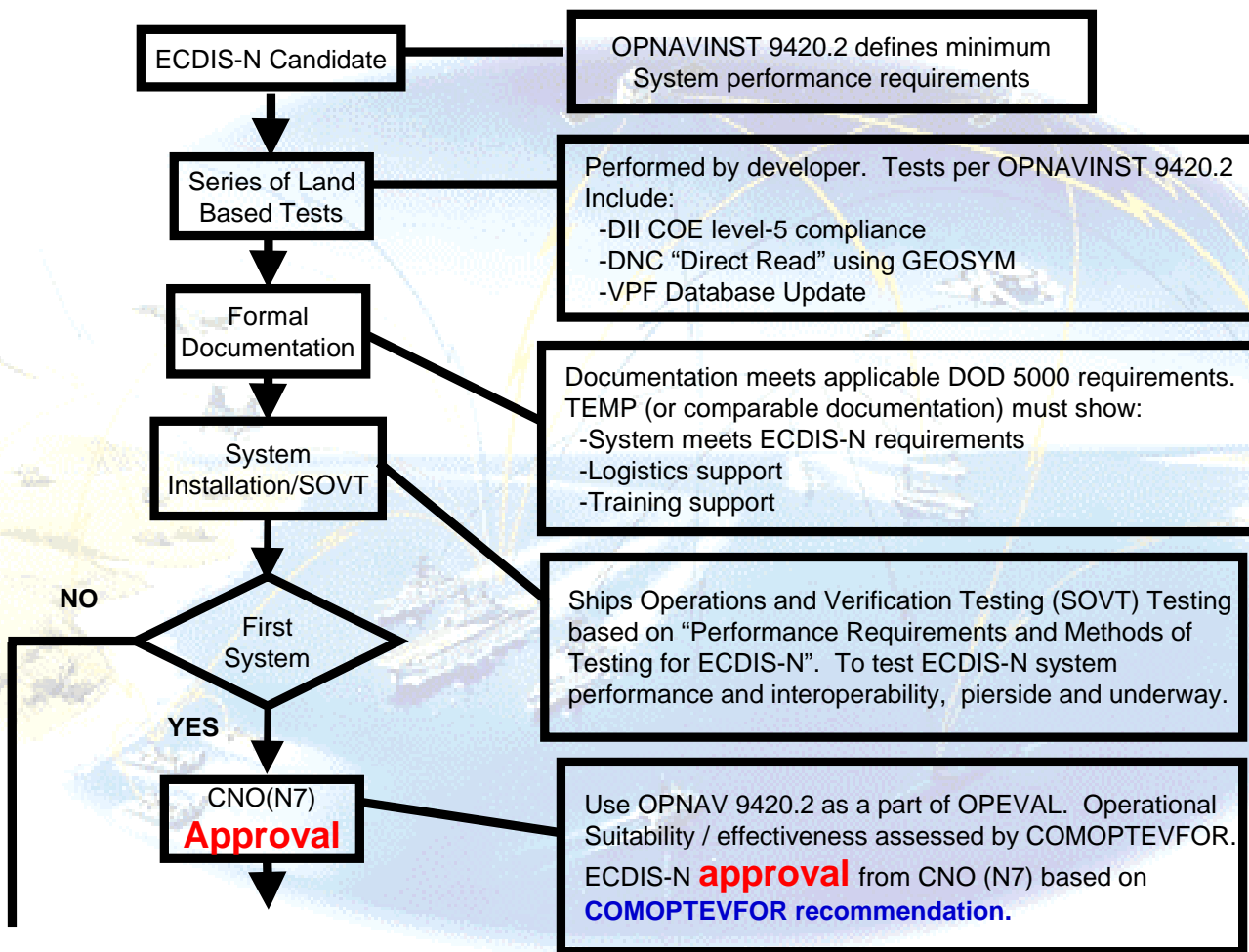
NAVCERT ECDIS-N

Certification Requirements

- ❑ ***OPNAV 9420.2 Section (4) (f) (1) The revised NAVCERT program shall incorporate all performance requirements from and follow the test methods of enclosure (1) “Performance Requirements and Methods of Testing for ECDIS-N”***
 - *Instruction allows tailoring of testing based on previous test results*
 - *Emphasis: interfaces, functional requirements, operational requirements including DNC/TOD display and operation, sensor inputs, updating (manual, VDU) and back-up capability*
- ❑ ***ECDIS-N Certification Prerequisite checklist***
 - *System approved by CNO N7*
 - *NIMA Direct Read Validation*
 - *Successful OPEVAL*

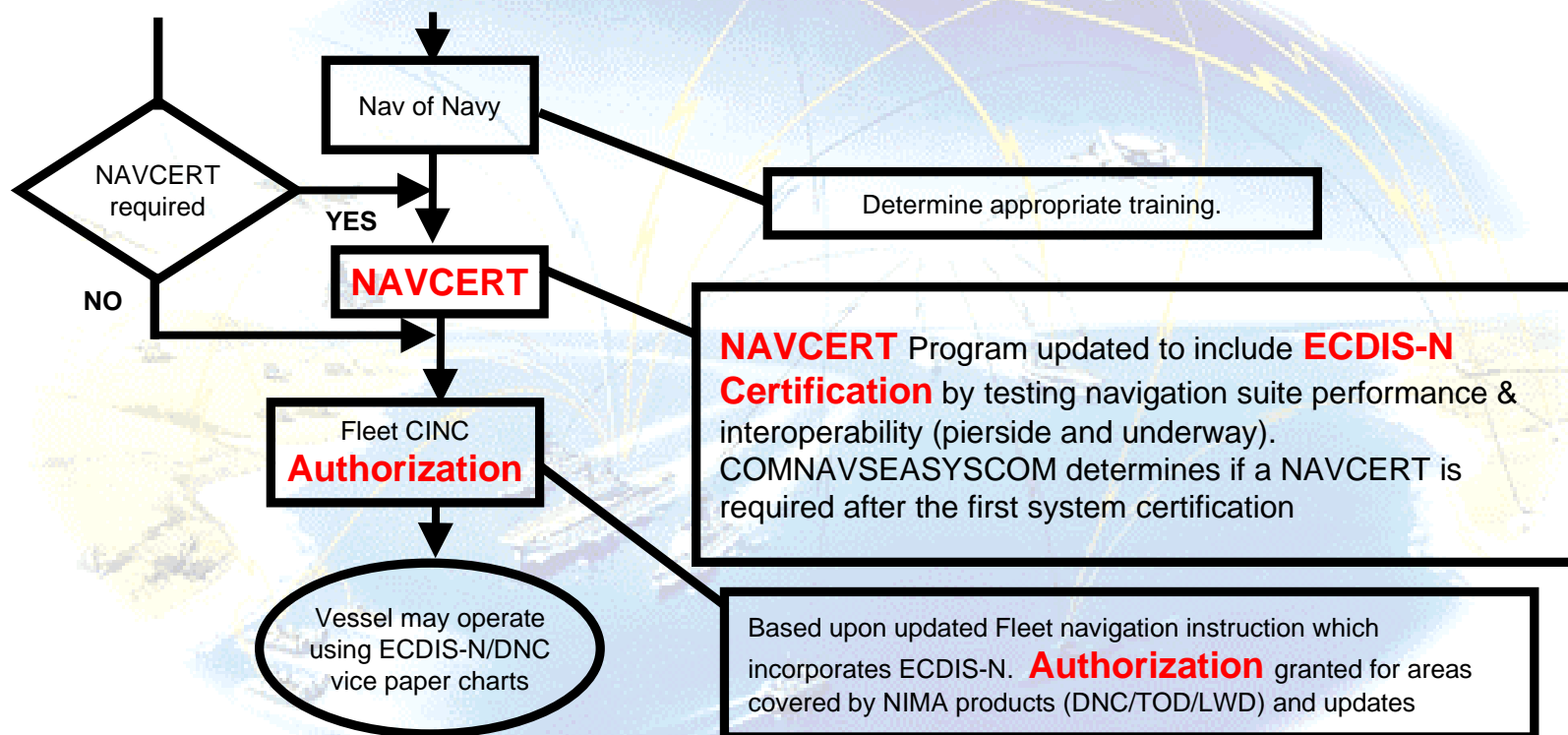


ECDIS-N Certification Process





ECDIS-N Certification Process





*What was the first U.S. Navy ship to
operate with any electronic chart?*

USS Pegasus (PHM 1), 1981



Basic Plan for NAVCERT including ECDIS-N Certification

- ☐ ***Revise existing NAVSEAINST 9420.3 of 2 July 98 to include Certification of ECDIS-N Systems as part of NAVCERT (becomes NAVSEAINST 9420.4)***
- ☐ ***Develop ECDIS-N Certification Test Procedures for NAVSSI and VMS “NAVSEA E9427-AJ-PRO-010 Certification Test Procedures for Electronic Chart Display and Information Systems – Navy (ECDIS-N) Dockside and At-Sea”***
- ☐ ***Revise existing surface and submarine certification procedures to include ECDIS-N certification testing***

<i>Surface WSN-5/NAVSSI</i>	<i>S9427-AC-PRO-010</i>
<i>Surface WSN-7/NAVSSI</i>	<i>S9427-AH-PRO-010</i>
<i>CV/CVN SNAIAS/NAVSSI</i>	<i>S9427-BA-PRO-010</i>
<i>Submarine Dockside</i>	<i>CWS Test No. 432-5-379</i>
<i>Submarine At-Sea</i>	<i>CWS Test No. 432-5-380</i>



NAVSEAINST 9420.4 Status

NAVSEAINST 9420.3 "Certification of Navigation Systems" of 2 July 1998 has been revised to include ECDIS-N Certification

(Anticipate NAVSEA approval by 30 Sep 01)

Summary of major revisions:

- ☐ *Incorporated requirement from OPNAVINST 9420.2 to certify ECDIS-N systems***
- ☐ *Incorporated new document for ECDIS-N Certification test procedures "NAVSEA E9427-AJ-PRO-010 Certification Test Procedures for Electronic Chart Display and Information Systems – Navy (ECDIS-N) Dockside and At-Sea"***
- ☐ *Defines responsibilities of Program Managers, TYCOMs, PMS 440, SPAWAR Code J34, SUPSHIP, Shipyards and ships force.***



ECDIS-N Certification Test Procedures

Shipboard ECDIS-N Certification will ensure:

- ☐ *Integrity of the entire ECDIS-N system, from sensors to charting system and on a continuing basis***
- ☐ *Requirements of OPNAVINST 9420.2 are met initially and that future changes made internally and externally will not affect the charting systems ability to meet these requirements***

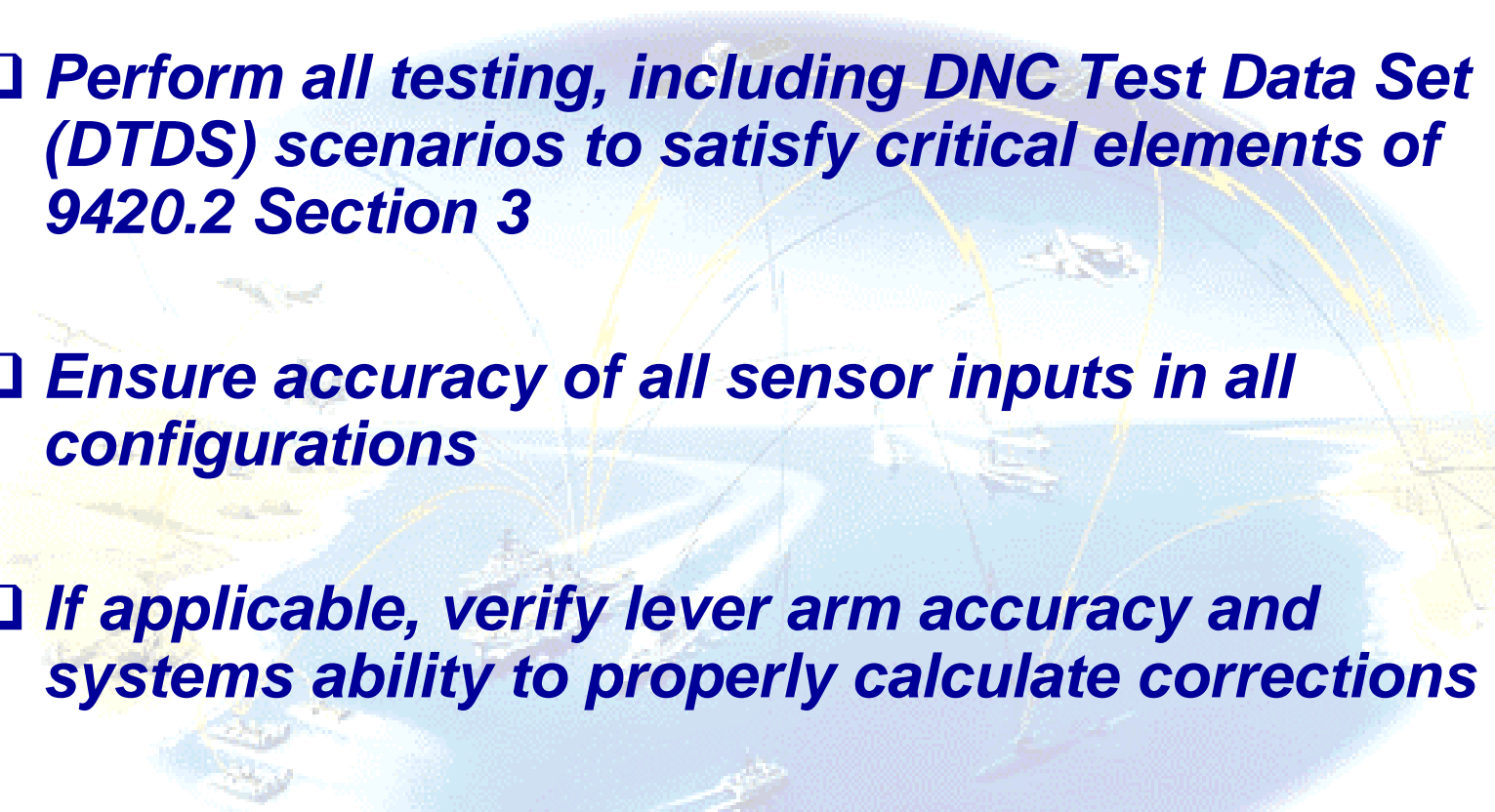


ECDIS-N Certification Test Procedures

- ☐ ***Procedures written for AN/BPS-15H and NAVSSI Block 3 Build 4 can be rolled into IBS and NAVSSI LITE procedures with minimal effort***
- ☐ ***Will be developed with input and review by subject matter experts from ECDIS-N programs of record and navigation community***
- ☐ ***Procedures can be finalized in approximately 3 months following access to the applicable ECDIS-N eligible charting software and applicable documentation***

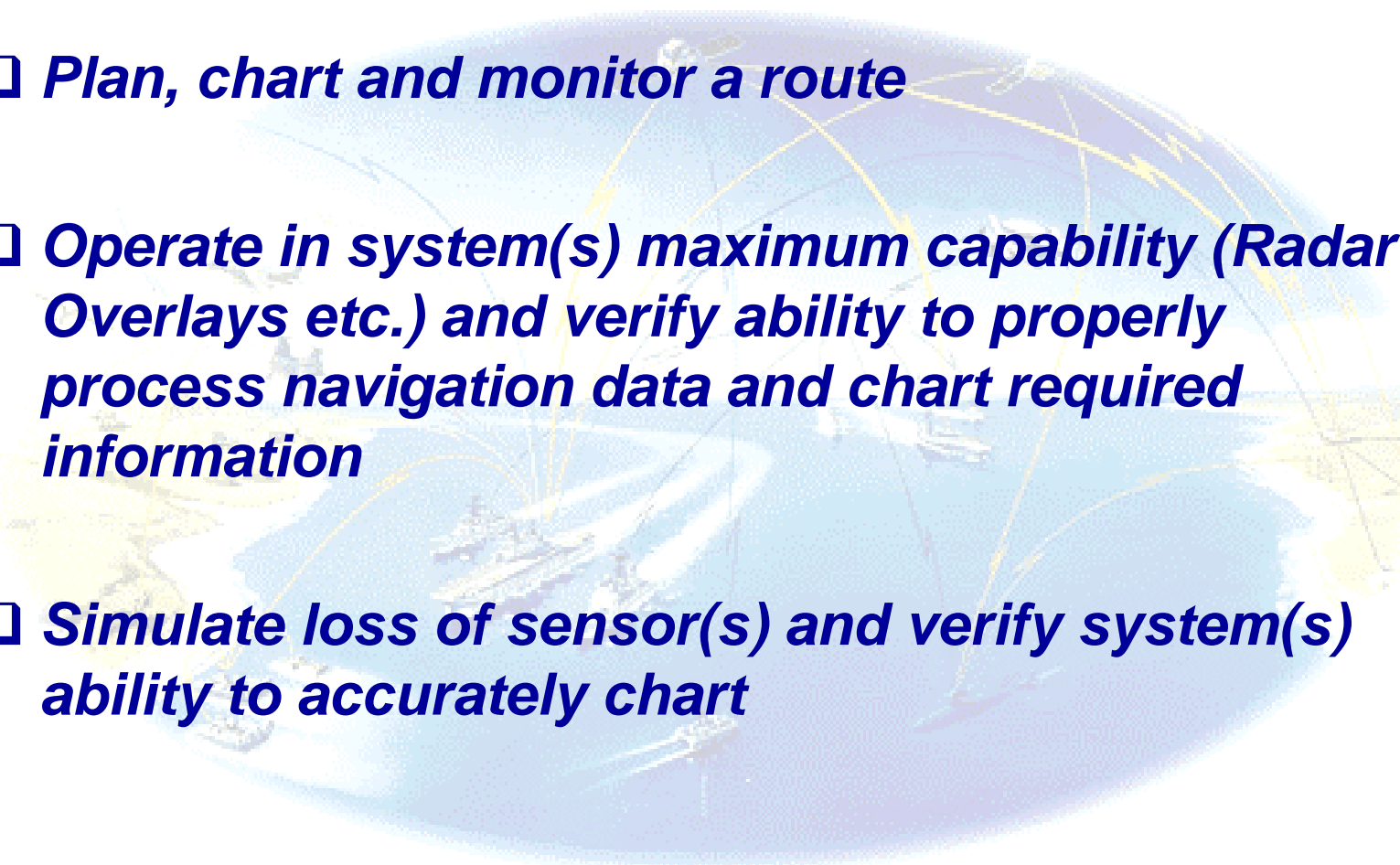


Dockside ECDIS-N Certification Testing

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- The background of the slide features a semi-transparent image of a globe. Overlaid on the globe are numerous yellow lines representing ship tracks or navigation paths. Several small, detailed images of ships are scattered across the globe, appearing to follow these paths. The overall color scheme is light blue and white, with the yellow tracks providing a high-contrast visual element.
- ☐ ***Perform all testing, including DNC Test Data Set (DTDS) scenarios to satisfy critical elements of 9420.2 Section 3***
 - ☐ ***Ensure accuracy of all sensor inputs in all configurations***
 - ☐ ***If applicable, verify lever arm accuracy and systems ability to properly calculate corrections***
 - ☐ ***Verify ship's planning and capability to manage backup charting method(s) and chart updates***

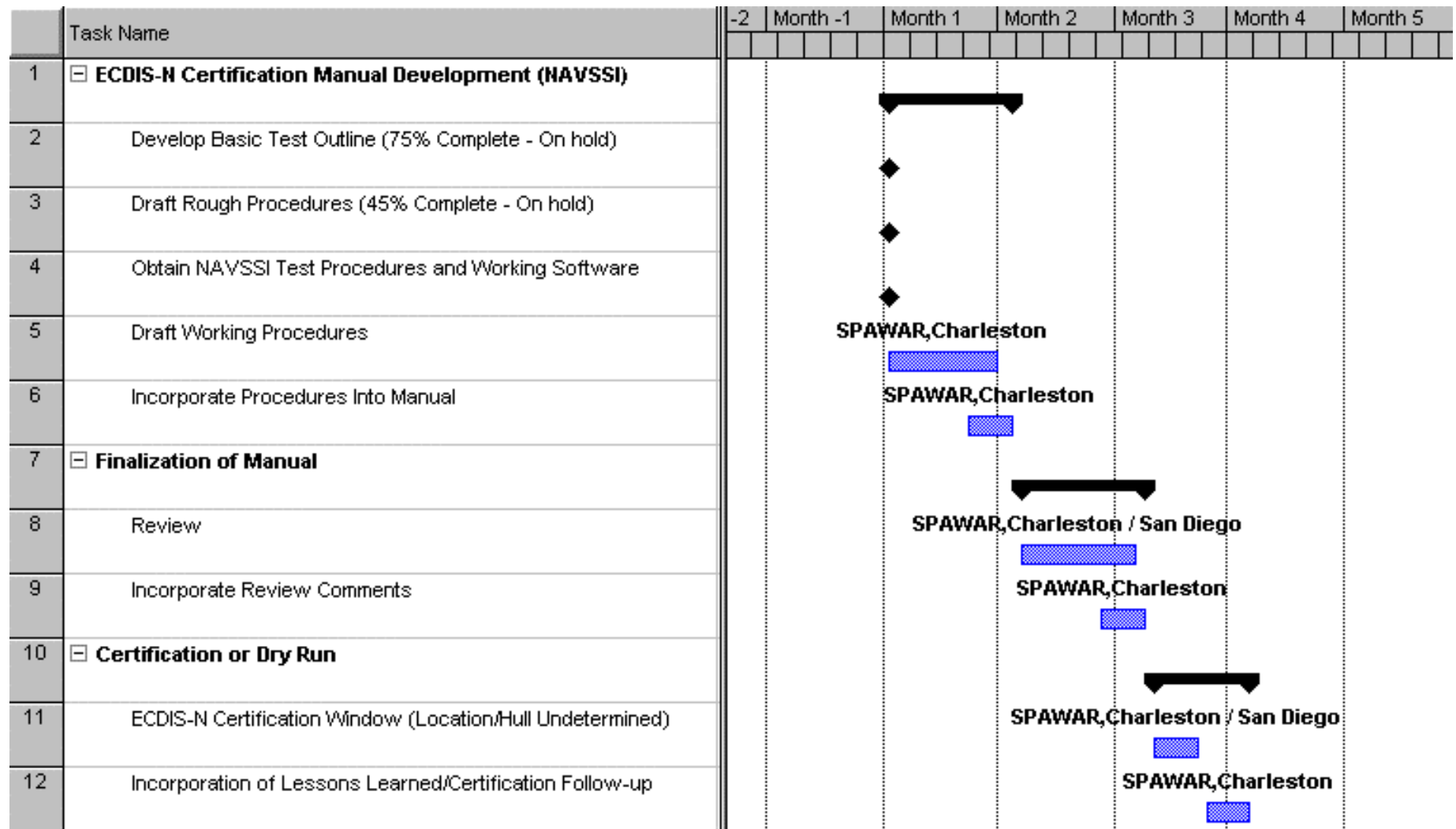


At-sea ECDIS-N Certification Testing

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- The background of the slide features a semi-transparent globe. Overlaid on the globe are several yellow lines representing navigation routes or great circles. Several small, detailed images of ships are scattered across the globe, appearing to travel along these routes. The overall color scheme is light blue and white, with the yellow lines providing a clear path across the globe.
- ☐ ***Plan, chart and monitor a route***
 - ☐ ***Operate in system(s) maximum capability (Radar Overlays etc.) and verify ability to properly process navigation data and chart required information***
 - ☐ ***Simulate loss of sensor(s) and verify system(s) ability to accurately chart***

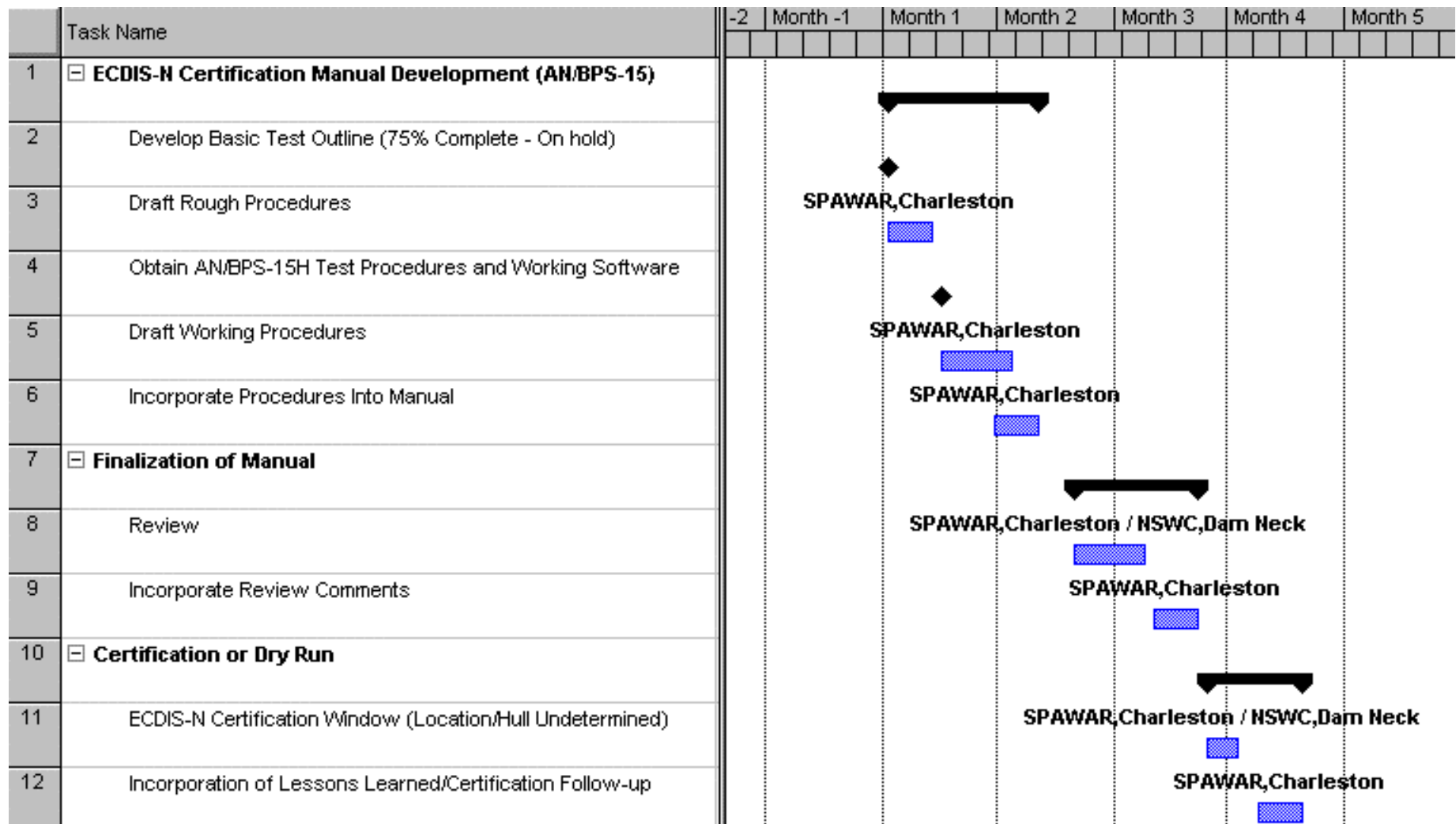



NAVSSI ECDIS-N Certification Test Procedure Development Schedule





AN/BPS15-H ECDIS-N Certification Test Procedure Development Schedule





When was the first major technical study of implementing electronic charts for navigation in the U.S. Navy?

**1986: “Planning for a Naval Electronic Chart”,
Gail Langran, Mary Clawson**



NAVCERT Background

- ☐ ***Introduced in 1968 and is the oldest NAVSEA certification program***
- ☐ ***NAVCERT provides uniform and consistent test procedures with well defined system certification authority and program execution responsibilities***
- ☐ ***Required by NAVSEA to assess installation, operation and performance of navigation systems and ability to support Navigation, Combat and Weapons suites***
- ☐ ***Prerequisite to Precision Approach and Landing System (PALS), Tomahawk and Harpoon certifications***



NAVCERT with ECDIS-N Options for FY 02 Battlegroups

Two certification options:

☐ Complete NAVCERT

- *Implies:* Impact to Combat Systems
- *Example:* Installation of NAVSSI, Inertial Navigation System

☐ ECDIS-N Certification only

- *Implies:* No impact to Combat Systems and recent uncompromised NAVCERT
- *Example:* Installation of NAVSSI Lite



NAVCERT

Estimated Duration per Ship

	<i>Dockside Period</i>	<i>At-Sea Period</i>	<i>Total Period</i>
<i>NAVCERT</i> <i>(ECDIS-N only)</i>	<i>2-3 days</i>	<i>1-2 days</i>	<i>3-5 days</i>
<i>NAVCERT</i>	<i>10-15 days</i>	<i>5-7 days</i>	<i>15-22 days</i>
<i>NAVCERT</i> <i>(with ECDIS-N)</i>	<i>10-15 days</i>	<i>5-7 days</i>	<i>15-22 days</i>



ECDIS-N Certification Plan for Abraham Lincoln BG 02

<i>Abraham Lincoln BG02 TCD 15 Dec 2001</i>	<i>Current Configuration</i>	<i>TCD Configuration</i>	<i>Current NAVCERT</i>	<i>Required NAVCERT</i>	<i>NAVCERT Availability</i>	<i>Prerequisite for NAVCERT</i>
USS Abraham Lincoln (CVN 72)	NAVSSI Blk 3 Bld 4	NAVSSI Blk 3 Bld 4 & INS	In Progress	ECDIS-N Cert only	Apr-May 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Shiloh (CG 67)	NAVSSI Blk 2	NAVSSI Lite	Aug-99	ECDIS-N Cert only	Apr-May 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Valley Forge (CG 50)	IBS (VMS)	IBS (VMS)	In Progress	ECDIS-N Cert only	Apr-May 02	Pending VMS ECDIS-N approval by CNO N7
USS Fletcher (DD 992)	NAVSSI Blk2	NAVSSI Lite	Aug-96	ECDIS-N Cert only	Apr-May 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Paul Hamilton (DDG 60)	NAVSSI Blk 3 Bld 2	NAVSSI Blk 3 Bld 4 & INS	Sep-99	NAVCERT	Apr-May 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Camden (A0E 2)	None	NAVSSI Lite	None	NAVCERT	Apr-May 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Cheyenne (SSN 773)	BPS-15H	BPS-15H	Aug-01	ECDIS-N Cert only	Apr-May 02	Pending VMS ECDIS-N approval by CNO N7
USS Honolulu (SSN 718)	BPS-15H	BPS-15H	Pending	ECDIS-N Cert only	Apr-May 02	Pending VMS ECDIS-N approval by CNO N7
HMCS Vancouver (FFH 331)	Unknown	Unknown	N/A	N/A	N/A	N/A
<i>Belleau Wood ARG 02 TCD 15 Dec 2001</i>						
USS Belleau Wood (LHA 3)	None	NAVSSI Lite	Aug-97	ECDIS-N Cert only	Apr-May 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Denver (LPD 9)	None	NAVSSI Lite	None	NAVCERT	Apr-May 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Mount Vernon (LSD 39)	None	NAVSSI Lite	None	NAVCERT	Apr-May 02	Pending NAVSSI ECDIS-N approval by CNO N7



ECDIS-N Certification Plan for Abraham Lincoln BG 02

<i>Counter Narcotics JIATF East 02-1 TCD 15 Feb 02</i>	<i>Current Configuration</i>	<i>TCD Configuration</i>	<i>Current NAVCERT</i>	<i>Required NAVCERT</i>	<i>NAVCERT Availability</i>	<i>Prerequisite for NAVCERT</i>
USS McClusky (FFG-41)	None	NAVSSI Lite	None	NAVCERT	Jun-Jul 02	Pending NAVSSI ECDIS-N approval by CNO N7
<i>Counter Narcotics JIATF West 01-3 TCD 30 Oct 01</i>						
USS Fife (DD 991)	None	NAVSSI Lite	In Progress	ECDIS-N Cert only	Mar-Apr 02	Pending NAVSSI ECDIS-N approval by CNO N7
<i>Mid East Force 02-2 TCD 28 Feb 02</i>						
USS Higgins (DDG 76)	NAVSSI Blk 3 Bld 2	NAVSSI Lite	Feb-00	ECDIS-N Cert only	Jul-Aug 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Millius (DDG 69)	NAVSSI Blk 3 Bld 2	NAVSSI Blk 3 Bld 4 & INS	Oct-99	NAVCERT	Jul-Aug 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Crommelin (FFG 37)	None	NAVSSI Lite	None	NAVCERT	Jul-Aug 02	Pending NAVSSI ECDIS-N approval by CNO N7



ECDIS-N Certification Plan for George Washington-Nassau BG 02

<i>George Washington-Nassau BG 02 TCD 10 Jan 2002</i>	<i>Current Configuration</i>	<i>TCD Configuration</i>	<i>Current NAVCERT</i>	<i>Required NAVCERT</i>	<i>NAVCERT Availability</i>	<i>Prerequisite for NAVCERT</i>
USS George Washington (CVN 73)	NAVSSI Blk 3 Bld 4	NAVSSI Blk 3 Bld 4 & INS	In Progress	NAVCERT	Jun-Jul 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Normandy (CG 60)	NAVSSI Blk 3 Bld 2	NAVSSI Lite	Mar-99	ECDIS-N Cert only	Jun-Jul 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Monterey (CG 61)	IBS (VMS)	IBS (VMS)	Apr-97	ECDIS-N Cert only	Jun-Jul 02	Pending VMS ECDIS-N approval by CNO N7
USS Barry (DDG 52)	None	NAVSSI Lite	Jan-93	ECDIS-N Cert only	Jun-Jul 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Laboon (DDG 58)	None	NAVSSI Lite	Sep-94	ECDIS-N Cert only	Jun-Jul 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Mahan (DDG 72)	NAVSSI Blk 3 Bld 4	NAVSSI Blk 3 Bld 4 & INS	Feb-01	ECDIS-N Cert only	Jun-Jul 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Arthur W. Radford (DD 968)	NAVSSI Blk 2	NAVSSI Lite	Apr-90	ECDIS-N Cert only	Jun-Jul 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Kaufman (FFG 59)	None	NAVSSI Lite	None	NAVCERT	Jun-Jul 02	Pending NAVSSI ECDIS-N approval by CNO N7
USNS Supply (T-AOE6)	None	None	None	None	N/A	No planned ECDIS-N system
USS Oklahoma City (SSN 723)	BPS-15H	BPS-15H	Mar-01	ECDIS-N Cert only	Jun-Jul 02	Pending VMS ECDIS-N approval by CNO N7
USS Newport News (SSN 750)	BPS-15H	BPS-15H	May-01	ECDIS-N Cert only	Jun-Jul 02	Pending VMS ECDIS-N approval by CNO N7
<i>Nassau ARG-02 TCD 10 Jan 2002</i>						
USS Nassau (LHA 4)	NAVSSI Blk 2	NAVSSI Lite	Mar-01	ECDIS-N Cert only	Jun-Jul 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Austin (LPD 4)	None	NAVSSI Lite	None	NAVCERT	Jun-Jul 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Tortuga (LSD 46)	None	NAVSSI Lite	None	NAVCERT	Jun-Jul 02	Pending NAVSSI ECDIS-N approval by CNO N7



ECDIS-N Certification Plan for George Washington-Nassau BG 02

<i>Mine Warfare Readiness Group 2 (2002) TCD 15 Feb 02</i>	<i>Current Configuration</i>	<i>TCD Configuration</i>	<i>Current NAVCERT</i>	<i>Required NAVCERT</i>	<i>NAVCERT Availability</i>	<i>Prerequisite for NAVCERT</i>
USS Champion (MCM 4)	None	NAVSSI Lite	None	NAVCERT	Jul-Aug 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Pioneer (MCM 9)	None	NAVSSI Lite	None	NAVCERT	Jul-Aug 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Osprey (MHC 51)	None	NAVSSI Lite	None	NAVCERT	Jul-Aug 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Heron (MHC52)	None	NAVSSI Lite	None	NAVCERT	Jul-Aug 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Pelican (MHC 53)	None	NAVSSI Lite	None	NAVCERT	Jul-Aug 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Falcon (MHC 59)	None	NAVSSI Lite	None	NAVCERT	Jul-Aug 02	Pending NAVSSI ECDIS-N approval by CNO N7
<i>SNFL 2-02 TCD 1 Jan 2002</i>						
USS Dewert (FFG 45)	None	NAVSSI Lite	None	NAVCERT	May-Jun 02	Pending NAVSSI ECDIS-N approval by CNO N7
<i>UNITAS TCD 1 Jan 2002</i>						
USS Ashland (LSD 48)	None	NAVSSI Lite	None	NAVCERT	Jun-Jul 02	Pending NAVSSI ECDIS-N approval by CNO N7
<i>TCD 7 Jan 2002</i>						
USS Samuel E. Morison (FFG 13)	None	NAVSSI Lite	None	NAVCERT	Jun-Jul 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS Simpson (FFG 56)	None	NAVSSI Lite	None	NAVCERT	Jun-Jul 02	Pending NAVSSI ECDIS-N approval by CNO N7
<i>TCD 1 Apr 2002</i>						
USS O'Bannon (DD 987)	NAVSSI Blk 2	NAVSSI Lite	Jun-94	ECDIS-N Cert only	Aug-Sep 02	Pending NAVSSI ECDIS-N approval by CNO N7
USS John L. Hall (FFG 32)	None	NAVSSI Lite	None	NAVCERT	Aug-Sep 02	Pending NAVSSI ECDIS-N approval by CNO N7

Issues

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- The background of the slide features a faint, stylized image of a globe. Overlaid on the globe are several yellow lines that represent the movement paths or tracks of ships across the world's oceans. The lines are curved and connect various points on the globe, suggesting global maritime activity.
- ☐ ***ECDIS-N certification dates will be driven by the CNO N7 approval of programs of record***
 - ☐ ***Coordination of ships' with ECDIS-N installation teams/NAVCERT teams will be critical***
 - ☐ ***The requirement to perform ECDIS-N certification in two FY02 Battlegroups increases SPAWAR FY02 Q2-Q4 NAVCERT effort by over 200%***



Critical Dates

To achieve deployment of the two FY02 battlegroups with certified ECDIS-N systems, we need:

- ❑ Access to the “certifiable” ECDIS-N software NLT January 2002***
- ❑ The ECDIS-N candidate systems need to be approved by CNO N7 NLT April 2002***



***What was the first U.S. Navy ship to
operate with DNC?***

USS Peterson (DD 969), 1994



Backup Slides

Commercial ECDIS Certification

DNC Direct Read Validation

ECDIS-N Documentation

Commercial ECDIS Certification


□ **From IMO Performance Standard, Section 2.1...**

- *2.1 Electronic Chart Display and Information Systems (ECDIS) – means a navigation information system which, with adequate back-up arrangements, can be accepted as complying with the up-to-date chart required by regulation V/20 of the 1974 SOLAS convention, by displaying selected information from a system electronic navigational chart (SENC) with positional information from navigation sensors to assist the mariner in route planning and route monitoring, and by displaying additional navigation-related information if required.*

□ **From IMO Performance standard, section 1.1...**

- *The primary function of the ECDIS is to contribute to safe navigation*

Commercial ECDIS Certification

- 
- The background of the slide features a faint, stylized image of a globe. Overlaid on the globe are numerous yellow lines representing shipping routes or great circles. The globe itself is rendered in light blue and white tones, with some darker blue areas suggesting landmasses.
- ❑ ***Two organizations that offer commercial “certification” for ECDIS systems***
 - *Det Norske Veritas (DNV)*
 - *Bundesamt für Seeschifffahrt und Hydrographie (BSH)*
 - ❑ ***“Certification” is actually referred to by both organizations as “type testing”***
 - ❑ ***Testing is accomplished on one system using IEC 61174 (First Edition 1998-08) and the IHO ENC Test Data Set (S-52 Appendix 4)***



Commercial ECDIS Certification

- 
- The background of the slide features a light blue globe. Overlaid on the globe are several yellow lines representing satellite orbits or data paths. Several small, detailed images of ships are scattered across the globe's surface, and a small satellite is visible in the upper left portion of the sky above the globe.
- ☐ ***ECDIS “Certification” certificates issued after successful testing***
 - ☐ ***All testing is done in a laboratory, no at-sea testing as part of ECDIS “certification”***
 - ☐ ***Any at-sea testing on an individual system is negotiated between the customer and ECDIS vendor***



Commercial ECDIS Certification

- This method of “certification” (or “type testing”) can serve the civil community well because the commercial ships have fewer and less complex navigation systems and interfaces (and no combat system interfaces)***
- Commercial ECDIS “Certification” is analogous to the U.S. Navy ECDIS-N “Approval” step***
- For U.S. Navy ECDIS-N “Certification” occurs on each ship as part of an enhanced NAVCERT!!!***

DNC Direct Read Validation

□ Requirement comes from OPNAVINST 9420.2, page 15:

- *3.16 Content and Structure of Chart Data*
- *3.16.1 The ECDIS-N shall be capable of performing a Direct Read of the DNC™ TOD™ for incorporation into the SDNC. Such data include both that contained in the original.*

□ Definition of Direct Read from OPNAVINST 9420.2, page 3:

- *Direct Read – the method by which an ECDIS-N reads, processes and displays chart data. The original VPF relational data (tables) are used to read in the native binary format to maintain the feature and attribute content and to enable the accurate display of and access to all VPF/DNC data.*



DNC Direct Read Validation

- ❑ DNC Direct Read Validation is accomplished using the DNC Test Data Set (DTDS – Version 1.1 the latest)***
- ❑ The DTDS is based on the Navy established requirement in OPNAVINST 9420.2, Enclosure (1), Appendix 7 (page 53)***
- ❑ The DTDS and the associated test procedures are used to assess and verify the ECDIS-N properly and accurately:***
 - Reads approved Vector Product Format (VPF) DNC***
 - Reads the Tactical Ocean Data (TOD)***
 - Displays VPF data using the NIMA Geospatial symbols (GEOSYM) for digital displays***
 - Utilizes NIMA's VPF Database Update (VDU) process to accurately update and maintain approved VPF electronic charts.***

ECDIS-N Documentation

Navigation and Safety

Chart content, Display and Updating

Equipment and Testing

